

<p>93-236579/30 B07 C07 D13 (D21) COLG 92.01.17          COLGATE PALMOLIVE CO *EP 552897-A1          92.01.17 92US-822241 (93.07.28) A23K 1/18, A61K 7/16          Chewable compsn. for animals - useful for removing plaque, tartar and stains (Eng)          C93-105374 R(AT BE CH DE DK ES FR GB IT LI LU NL SE)          Addnl. Data: SIMONE A J, HAND M S, HEFFERREN J J, HUBER G          93.01.15 93EP-300268</p>	<p>BC(4-B4A6, 4-C2B2, 4-C3C, 5-B2A3, 12-L3, 12-L9) D(3-G, 8-A)</p>
<p>Compsn. to be chewed by an animal, to remove plaque, tartar and stains from teeth, comprises an edible solid prod. having (a) a chewable, flexible cellular matrix, in which is incorporated (b) a cellulosic fibrous material.</p>	<p>additive which is one or more alkali metal pyrophosphate salt(s), esp. a mixt. of potassium- and sodium-pyrophosphates in a wt. ratio of 5-3:1. The cellular matrix is inert to the oral care additive, and contains water (10-35 wt%).          The prod. also comprises a humectant, and a linear polymeric polycarboxylate which inhibits salivary degradation of the prod.</p>
<p><b>USE/ADVANTAGE</b>          The compsn. is useful for pets, e.g. dogs or cats. It is more effective than the compsns. described in EP-272968, US5000940 or US5000943, in that it is edible, more effective, stable to chewing and does not cause gastrointestinal blockage when eaten.</p> <p><b>PREFERRED COMPOSITION</b>          The cellular matrix comprises starch and incorporates a proteinaceous binder. It also incorporates an oral care</p>	<p><b>EXAMPLE</b>          A compsn. was prepd. contg. wheat starch (45.42 wt%), corn cob fraction (32.58 wt%), gelatin (225 Bloom; 9.87 wt%), glycerin (4.44 wt%), potassium sorbate (0.30 wt%), <math>K_4P_2O_7</math> (4 wt%), <math>Na_4P_2O_7</math> (1.38 wt%) and Gantrez S-97 (TM: polymeric polycarboxylates, 1.92 wt% of 13% soln.).          In tests on dogs this compsn. reduced plaque by 37%, stain by 65% and tartar by 52.4%. A compsn. not contg. pyrophosphate salts reduced plaque by 23.7%, stain by 34.7% and tartar by 31.6%. (11pp2355JMDwgNo0/0).</p> <p>SR:DD280897 EP333301 GB1398561 US4044158 US4260635 US4400297          US4702929 US4892748 US4904494 US5000943</p> <p>-----          EP-552897-A</p>

### Principal Differences

- Matrix device (not 2-phase system) incorporated with a limited range of actives - alkali metal derivatives / salts and polycarboxylates → no other ingredients (actives) claimed.
- Claim that "starch" component impart elasticity and texture, feel to promote chewing = no link to oral exposure / bioavailability
- No mention of controlling chew size to promote chewing
- No exemplification of mechanical properties require for "chewability".
- Invariant step for us is the provision of the active in the liquid-form would provide rapid release → continued chewing → effective distribution in the oral cavity.

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DIALOG(R)File 345:Inpadoc/Fam.& Legal Stat  
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Basic Patent (No,Kind,Date): NO 9300149 A0 19930115 <No. of Patents: 018>

Patent Family:

Patent No	Kind	Date	Applic No	Kind	Date
AT 166537	E	19980615	EP 93300268	A	19930115
AU 9331833	A1	19930722	AU 9331833	A	19930115
AU 660755	B2	19950706	AU 9331833	A	19930115
CA 2086965	AA	19930718	CA 2086965	A	19930108
DE 69318736	C0	19980702	DE 69318736	A	19930115
DE 69318736	T2	19981126	DE 69318736	A	19930115
EP 552897	A1	19930728	EP 93300268	A	19930115
EP 552897	B1	19980527	EP 93300268	A	19930115
ES 2118183	T3	19980916	ES 93300268	EP	19930115
FI 9300174	A	19931110	FI 93174	A	19930115
FI 9300174	A0	19930115	FI 93174	A	19930115
JP 5255055	A2	19931005	JP 935940	A	19930118
NO 9300149	A	19930719	NO 93149	A	19930115
NO 9300149	A0	19930115	NO 93149	A	19930115
NO 304967	B1	19990315	NO 93149	A	19930115
PT 101177	A	19940228	PT 101177	A	19930115
US 5296209	A	19940322	US 822241	A	19920117
US 5407661	A	19950418	US 118369	A	19930908

(BASIC)

Priority Data (No,Kind,Date):

US 822241 A 19920117  
US 118369 A 19930908  
US 822241 A1 19920117

PATENT FAMILY:

AUSTRIA (AT)

Patent (No,Kind,Date): AT 166537 E 19980615  
KAUPRODUKT ZUR MUNDPFLEGE VON HAUSTIEREN (German)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J (US); HAND MICHAEL S (US);  
HEFFERREN JOHN J (US); HUBER GORDON (US)  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): EP 93300268 A 19930115  
Addnl Info: 00552897 19980527  
IPC: \* A23K-001/18; A61K-007/16  
Derwent WPI Acc No: \* C 93-236579  
Language of Document: German

AUSTRIA (AT)

Legal Status (No,Type,Date,Code,Text):

AT 166537 R 19980615 AT REF CORRESPONDS TO EP-PATENT  
(ENTSPRICHT EP-PATENT)  
EP 552897 P 19980527  
AT 166537 R 19990215 AT UEP PUBLICATION OF TRANSLATION  
OF EUROPEAN PATENT SPECIFICATION  
(UEBERSETZUNG DER EUROPÄISCHEN PATENTSCHRIFT  
AUSGEGEBEN)

AUSTRALIA (AU)

Patent (No,Kind,Date): AU 9331833 A1 19930722  
PET CHEW PRODUCT HAVING ORAL CARE PROPERTIES (English)  
Patent Assignee: COLGATE PALMOLIVE CO  
Author (Inventor): SIMONE ALEXANDER J; HEFFERREN JOHN J; HAND MICHAEL  
S; HUBER GORDON

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Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): AU 9331833 A 19930115  
IPC: \* A61K-007/26  
Language of Document: English  
Patent (No,Kind,Date): AU 660755 B2 19950706  
PET CHEW PRODUCT HAVING ORAL CARE PROPERTIES (English)  
Patent Assignee: COLGATE PALMOLIVE CO  
Author (Inventor): SIMONE ALEXANDER J; HEFFERREN JOHN J; HAND MICHAEL S; HUBER GORDON  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): AU 9331833 A 19930115  
IPC: \* A61K-007/26; A23K-001/16; A23K-001/14  
Derwent WPI Acc No: \* C 93-236579  
Language of Document: English

CANADA (CA)

Patent (No,Kind,Date): CA 2086965 AA 19930718  
PET CHEW PRODUCT HAVING ORAL CARE PROPERTIES (English; French)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J (US); HEFFERREN JOHN J (US); HAND MICHAEL S (US); HUBER GORDON (US)  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): CA 2086965 A 19930108  
IPC: \* A23K-001/16  
Language of Document: English

GERMANY (DE)

Patent (No,Kind,Date): DE 69318736 C0 19980702  
KAUPRODUKT ZUR MUNDPFLEGE VON HAUSTIEREN (German)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J (US); HAND MICHAEL S (US); HEFFERREN JOHN J (US); HUBER GORDON (US)  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): DE 69318736 A 19930115  
IPC: \* A23K-001/18; A61K-007/16  
Derwent WPI Acc No: \* C 93-236579  
Language of Document: German  
Patent (No,Kind,Date): DE 69318736 T2 19981126  
KAUPRODUKT ZUR MUNDPFLEGE VON HAUSTIEREN (German)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J (US); HAND MICHAEL S (US); HEFFERREN JOHN J (US); HUBER GORDON (US)  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): DE 69318736 A 19930115  
IPC: \* A23K-001/18; A61K-007/16  
Derwent WPI Acc No: \* C 93-236579  
Language of Document: German

GERMANY (DE)

Legal Status (No,Type,Date,Code,Text):  
DE 69318736 P 19980702 DE REF CORRESPONDS TO (ENTSPRICHT)  
EP 552897 P 19980702  
DE 69318736 P 19981126 DE 8373 TRANSLATION OF PATENT  
DOCUMENT OF EUROPEAN PATENT WAS RECEIVED AND  
HAS BEEN PUBLISHED (UEBERSETZUNG DER  
PATENTSCHRIFT DES EUROPÄISCHEN PATENTES IST  
EINGEGANGEN UND VEROEFFENTLICHT WORDEN)  
DE 69318736 P 19990701 DE 8364 NO OPPOSITION DURING TERM OF  
OPPOSITION (EINSPRUCHSFRIST ABGELAUFEN OHNE  
DASS EINSPRUCH ERHOBEN WURDE)

EUROPEAN PATENT OFFICE (EP)

Patent (No,Kind,Date): EP 552897 A1 19930728

clare

PET CHEW PRODUCT HAVING ORAL CARE PROPERTIES (English; French; German)  
 Patent Assignee: COLGATE PALMOLIVE CO (US)  
 Author (Inventor): SIMONE ALEXANDER J (US); HAND MICHAEL S (US);  
 HEFFERREN JOHN J (US); HUBER GORDON (US)  
 Priority (No,Kind,Date): US 822241 A 19920117  
 Applic (No,Kind,Date): EP 93300268 A 19930115  
 Designated States: (National) AT; BE; CH; DE; DK; ES; FR; GB; IT; LI;  
 LU; NL; SE  
 IPC: \* A23K-001/18; A61K-007/16  
 Language of Document: English  
 Patent (No,Kind,Date): EP 552897 B1 19980527  
 PET CHEW PRODUCT HAVING ORAL CARE PROPERTIES (English; French; German)  
 Patent Assignee: COLGATE PALMOLIVE CO (US)  
 Author (Inventor): SIMONE ALEXANDER J (US); HAND MICHAEL S (US);  
 HEFFERREN JOHN J (US); HUBER GORDON (US)  
 Priority (No,Kind,Date): US 822241 A 19920117  
 Applic (No,Kind,Date): EP 93300268 A 19930115  
 Designated States: (National) AT; BE; CH; DE; DK; ES; FR; GB; IT; LI;  
 LU; NL; SE  
 IPC: \* A23K-001/18; A61K-007/16  
 Derwent WPI Acc No: \* C 93-236579  
 Language of Document: English

# EUROPEAN PATENT OFFICE (EP)

Legal Status (No,Type,Date,Code,Text):

EP 552897	P	19920117	EP AA	PRIORITY (PATENT APPLICATION) (PRIORITAET (PATENTANMELDUNG))
				US 822241 A 19920117
EP 552897	P	19930115	EP AE	EP-APPLICATION (EUROPAEISCHE ANMELDUNG)
				EP 93300268 A 19930115
EP 552897	P	19930728	EP AK	DESIGNATED CONTRACTING STATES IN AN APPLICATION WITH SEARCH REPORT (IN EINER ANMELDUNG BENANNT VERTRAGSSTAATEN)
				AT BE CH DE DK ES FR GB IT LI LU NL SE
EP 552897	P	19930728	EP A1	PUBLICATION OF APPLICATION WITH SEARCH REPORT (VEROEFFENTLICHUNG DER ANMELDUNG MIT RECHERCHENBERICHT)
EP 552897	P	19930728	EP 17P	REQUEST FOR EXAMINATION FILED (PRUEFUNGSANTRAG GESTELLT)
				930204
EP 552897	P	19960911	EP 17Q	FIRST EXAMINATION REPORT (ERSTER PRUEFUNGSBESCHEID)
				960729
EP 552897	P	19980527	EP AK	DESIGNATED CONTRACTING STATES MENTIONED IN A PATENT SPECIFICATION: (IN EINER PATENTSCHRIFT ANGEFUEHRTE BENANNT VERTRAGSSTAATEN)
				AT BE CH DE DK ES FR GB IT LI LU NL SE
EP 552897	P	19980527	EP B1	PATENT SPECIFICATION (PATENTSCHRIFT)
EP 552897	P	19980527	EP REF	IN AUSTRIA REGISTERED AS: (IN AT EINGETRAGEN ALS:)
				AT 166537 R 19980615
EP 552897	P	19980529	CH EP/REG	ENTRY IN THE NATIONAL PHASE (EINTRITT IN DIE NATIONALE PHASE)
EP 552897	P	19980529	CH EP/REG	ENTRY IN THE NATIONAL PHASE (EINTRITT IN DIE NATIONALE PHASE)
EP 552897	P	19980702	EP REF	CORRESPONDS TO: (ENTSPRICHT)
				DE 69318736 P 19980702

EP 552897 P 19980706 EP ITF IT: TRANSLATION FOR A EP  
PATENT FILED (IT: DEPOSITO TRADUZIONE DI  
BREVETTO EUROPEO)  
BARZANO' E ZANARDO ROMA S.P.A.  
EP 552897 P 19980821 EP ET FR: TRANSLATION FILED (FR:  
TRADUCTION A ETE REMISE)  
EP 552897 P 19980916 ES FG2A/REG DEFINITIVE PROTECTION  
(PROTECCION DEFINITIVA)  
2118183T3  
EP 552897 P 19990526 EP 26N NO OPPOSITION FILED (KEIN  
EINSPRUCH EINGELEGT)

#### SPAIN (ES)

Patent (No,Kind,Date): ES 2118183 T3 19980916  
PRODUCTO MASTICABLE QUE TIENE PROPIEDADES PARA EL CUIDADO DE LA BOCA DE  
ANIMALES DE COMPANIA. (Spanish)  
Patent Assignee: COLGATE PALMOLIVE CO  
Author (Inventor): SIMONE ALEXANDER J (US); HAND MICHAEL S (US);  
HEFFERREN JOHN J (US); HUBER GORDON (US)  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): ES 93300268 EP 19930115  
Addnl Info: 0552897 EP patent valid in AT  
IPC: \* A23K-001/18; A61K-007/16  
Derwent WPI Acc No: \* C 93-236579  
Language of Document: Spanish

#### SPAIN (ES)

Legal Status (No,Type,Date,Code,Text):  
ES 2118183 P 19980916 ES FG2A DEFINITIVE PROTECTION  
(PROTECCION DEFINITIVA)  
552897

#### FINLAND (FI)

Patent (No,Kind,Date): FI 9300174 A 19931110  
TUGGPRODUKT MED ORALVAORDSEGENSKAPER FOER KELDJUR (Swedish)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J (US); HEFFERREN JOHN J (US);  
HAND MICHAEL S (US); HUBER GORDON (US)  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): FI 93174 A 19930115  
Derwent WPI Acc No: \* C 93-236579  
Language of Document: Finnish; Swedish  
Patent (No,Kind,Date): FI 9300174 A0 19930115  
TUGGPRODUKT MED ORALVAORDSEGENSKAPER FOER KELDJUR (Swedish)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J (US); HEFFERREN JOHN J (US);  
HAND MICHAEL S (US); HUBER GORDON (US)  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): FI 93174 A 19930115  
Language of Document: Finnish; Swedish

#### FINLAND (FI)

Legal Status (No,Type,Date,Code,Text):  
FI 930174 A 19930115 FI AE New application filed (Uusi  
hakemus)  
FI 93174 A 19930115

#### JAPAN (JP)

Patent (No,Kind,Date): JP 5255055 A2 19931005  
PET CHEWING PRODUCT HAVING ORAL CAVITY CARE CAPACITY (English)  
Patent Assignee: COLGATE PALMOLIVE CO  
Author (Inventor): AREKUSANDAA JIEI SHIMON; JIYON JIEI HEFUAAREN;  
MAIKERU ESU HANDO; GOODON HIYUUBAA  
Priority (No,Kind,Date): US 822241 A 19920117

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Applic (No,Kind,Date): JP 935940 A 19930118  
IPC: \* A61K-007/16; A23G-003/30; A23K-001/00; A23K-001/18  
Language of Document: Japanese

NORWAY (NO)

Patent (No,Kind,Date): NO 9300149 A 19930719  
TYGGBART MATERIALE FOR TANNPLEIE HOS KJAELEDYR (Norwegian)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J; HEFFERREN JOHN J; HAND MICHAEL S; HUBER GORDON  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): NO 93149 A 19930115  
IPC: \* A61K-007/26; A61K-007/16  
Language of Document: Norwegian  
Patent (No,Kind,Date): NO 9300149 A0 19930115  
TYGGBART MATERIALE FOR TANNPLEIE HOS KJAELEDYR (Norwegian)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J; HEFFERREN JOHN J; HAND MICHAEL S; HUBER GORDON  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): NO 93149 A 19930115  
IPC: \* A61K-007/16  
Language of Document: Norwegian  
Patent (No,Kind,Date): NO 304967 B1 19990315  
MUNNPLEIEPRODUKT FOR KJ LEDYR OG ANVENDELSE AV CELLULOSEFIBERMATERIALER I DETTE (Norwegian)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J (US); HEFFERREN JOHN J (US); HAND MICHAEL S (US); HUBER GORDON (US)  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): NO 93149 A 19930115  
IPC: \* A61K-007/26  
Derwent WPI Acc No: \* C 93-236579  
Language of Document: Norwegian

PORTUGAL (PT)

Patent (No,Kind,Date): PT 101177 A 19940228  
PRODUTO DE MASCAR PARA UM ANIMAL DE ESTIMACAO DOTADO DE PROPRIEDADES PARA HIGIENE ORAL (English; French; German; Portugese)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J (US); HEFFERREN USHN J (US); HAND MICHAEL S (US); HUBER GORDON (US)  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): PT 101177 A 19930115  
IPC: \* A61K-007/16  
Derwent WPI Acc No: \* C 93-236579  
Language of Document: Portugese

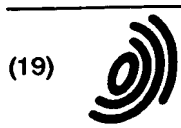
PORTUGAL (PT)

Legal Status (No,Type,Date,Code,Text):  
PT 101177 P 19940228 PT BB1A LAYING OPEN OF PATENT APPLICATION (PUBLICACAO DE PEDIDO DE INVENCAO)  
930721

UNITED STATES OF AMERICA (US)

Patent (No,Kind,Date): US 5296209 A 19940322  
PET CHEW PRODUCT HAVING ORAL CARE PROPERTIES (English)  
Patent Assignee: COLGATE PALMOLIVE CO (US)  
Author (Inventor): SIMONE ALEXANDER J (US); HEFFERREN JOHN J (US); HAND MICHAEL S (US); HUBER GORDON (US)  
Priority (No,Kind,Date): US 822241 A 19920117  
Applic (No,Kind,Date): US 822241 A 19920117

clare



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Office européen des brevets



(11) **EP 0 552 897 B1**

(12)

## EUROPEAN PATENT SPECIFICATION

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of the grant of the patent:  
27.05.1998 Bulletin 1998/22

(51) Int. Cl.<sup>6</sup>: **A23K 1/18, A61K 7/16**

(21) Application number: **93300268.5**

(22) Date of filing: **15.01.1993**

### (54) **Pet chew product having oral care properties**

Kauprodukt zur Mundpflege von Haustieren

Produit à mâcher pour soins buccaux d'animaux domestiques

(84) Designated Contracting States:  
**AT BE CH DE DK ES FR GB IT LI LU NL SE**

(30) Priority: **17.01.1992 US 822241**

(43) Date of publication of application:  
**28.07.1993 Bulletin 1993/30**

(73) Proprietor:  
**Colgate-Palmolive Company**  
**New York, N.Y. 10022-7499 (US)**

(72) Inventors:  
• **Simone, Alexander J.**  
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**Maple Hill, Kansas (US)**

• **Hefferren, John J.**  
**Lawrence, Kansas (US)**  
• **Huber, Gordon**  
**Sabetha, Kansas (US)**

(74) Representative:  
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**20 Red Lion Street**  
**London, WC1R 4PJ (GB)**

(56) References cited:

<b>EP-A- 333 301</b>	<b>DD-A- 280 897</b>
<b>GB-A- 1 398 561</b>	<b>US-A- 4 044 158</b>
<b>US-A- 4 260 635</b>	<b>US-A- 4 400 297</b>
<b>US-A- 4 702 929</b>	<b>US-A- 4 892 748</b>
<b>US-A- 4 904 494</b>	<b>US-A- 5 000 943</b>

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

**EP 0 552 897 B1**

National Class: \* 424049000; 424058000; 424401000; 424439000;  
 424447000; 424442000; 426003000; 426549000; 426560000; 426578000;  
 426618000; 426623000; 426630000; 426635000; 426648000; 426658000;  
 426805000; 426807000  
 IPC: \* A61K-007/16; A61K-009/20; A61K-031/715; A61K-007/26  
 Derwent WPI Acc No: \* C 93-236579  
 Language of Document: English  
 Patent (No,Kind,Date): US 5407661 A 19950418  
 PET CHEW PRODUCT HAVING ORAL CARE PROPERTIES (English)  
 Patent Assignee: COLGATE PALMOLIVE CO (US)  
 Author (Inventor): SIMONE ALEXANDER J (US); HEFFERREN JOHN J (US);  
 HAND MICHAEL S (US); HUBER GORDON (US)  
 Priority (No,Kind,Date): US 118369 A 19930908; US 822241 A1  
 19920117  
 Applic (No,Kind,Date): US 118369 A 19930908  
 Addnl Info: 5296209 Patented  
 National Class: \* 424049000; 424401000; 424439000; 424442000;  
 424057000; 426807000; 426805000  
 IPC: \* A61K-007/16; A61K-009/20; A61K-031/715; A61K-007/26  
 Derwent WPI Acc No: \* C 93-236579  
 Language of Document: English

UNITED STATES OF AMERICA (US)

Legal Status (No,Type,Date,Code,Text):

US 5296209	P	19920117	US AE	APPLICATION DATA (PATENT)
				(APPL. DATA (PATENT))
			US 822241 A	19920117
US 5296209	P	19930907	US AS02	ASSIGNMENT OF ASSIGNOR'S
				INTEREST
				COLGATE-PALMOLIVE COMPANY A CORPORATION OF
				DELAWARE 909 RIVER ROAD PISCATAWAY, N ;
				SIMONE, ALEXANDER : 19911204; HAND, MICHAEL
				S. : 19911213
US 5296209	P	19940322	US A	PATENT
US 5407661	P	19920117	US AA	PRIORITY
			US 822241 A1	19920117
US 5407661	P	19930908	US AE	APPLICATION DATA (PATENT)
				(APPL. DATA (PATENT))
			US 118369 A	19930908
US 5407661	P	19950418	US A	PATENT



## Description

BACKGROUND OF THE INVENTION5 1. Field of the Invention

This invention relates to an edible animal chew product having a flexible, inert cellular matrix containing a cellulosic fibrous material. The edible product, when chewed by animals such as dogs and cats, reduces plaque, stain and tartar.

10 DESCRIPTION OF THE PRIOR ART

Animal pets, such as dogs and cats, like their human counterparts, are subject to dental health problems. These problems can be traced to the formation of bacterial plaque which forms on the exterior surface of teeth. Plaque is an invisible, sticky film of bacteria, salivary proteins and polysaccharides which is not easily washed away. Plaque is now generally recognized as the main culprit of poor oral health. Bacteria that produce the acid for the caries process are held to the tooth surface by the plaque matrix as well as other bacteria which cause redness and swelling (gingivitis). The presence of these bacteria, if left untreated, may spread to cause malodor, periodontal disease, gingival pockets and bone loss.

Dental calculus, or tartar, is the result of the thickening and hardening (mineralization) of dental plaque. Tartar which is not easily removed accumulates on the tooth surface, mainly at the gingival margin opposite the salivary glands. It is a hard mineral deposit containing predominantly calcium and phosphate, very tightly bound to the tooth surface. Once it is formed, tartar is virtually impossible to remove except by a dental professional. Tartar can become unsightly if growth is left unimpeded, and elimination is desirable as the porous surface of the calculus will be covered by a thin layer of unmineralized plaque which can cause constant irritation of the gums and can trigger other problems once calculus is formed below the gum line.

Commercial animal pet foods do not provide sufficient surface cleaning to teeth to provide for plaque removal from the animal's teeth necessary for optimum dental health.

A variety of products are manufactured to provide animal pets with objects to chew or gnaw. They are intended to provide the pet with exercise for the teeth to maintain a healthy condition satisfying a need which arose when the natural pet food, raw meat, was replaced with processed pet foods. Rawhide strips knotted on the ends to resemble bones, for example, provide abrasion for cleaning teeth by removing tartar and massaging the gums, which is not provided by the typical canine dog food. The rawhide dog chews are expensive, and the indigestible leather fragments swallowed by the dogs frequently cause severe gastrointestinal blockage or diarrhea.

European patent 272,968 discloses a chewable product for dogs and other domestic animals wherein certain aqueous solutions of oral care agents, e.g., sodium fluoride (anti-carries agent), sodium benzoate (anticalculus agent) and bromochlorophene (antimicrobial/antiplaque agent) are used to soak rawhide, beef tendon, or ligament. The solution treated product is then dried whereby the oral care agents are absorbed into the surface of the product.

U.S. Patents 5,000,940 and 5,000,943 disclose baked dog biscuits containing an inorganic pyrophosphate salt, e.g., tetrasodium pyrophosphate, which when chewed and/or eaten by dogs cause a reduction in tartar accumulations on their teeth.

The oral care agents incorporated in the pet food products of the prior art have either limited efficacy in oral care, or are incompatible and deactivated by the ingredients found in the products into which these agents are incorporated. For example, anti-tartar pyrophosphate salts incorporated in pet food products containing an excess of polyvalent cations, and particularly calcium, are rendered inactive by the calcium ion interacting with the pyrophosphate rendering it insoluble and thereby inactive.

Attempts to incorporate other oral care agents such as fluoride compounds in animal chews were unsuccessful as these compounds were also incompatible and unstable with ingredients from which the pet food product was fabricated.

A further disadvantage of the prior art pet oral care products is that they are baked products which are hard and brittle and, although abrasive and initially effective to remove plaque from teeth, quickly lose their effectiveness when chewed because rapid fracture of the product leads to loss of contact of the product with the teeth.

USP 4892748 discloses a dog treat based on cellulosic fibrous material bound with a gum system such as methyl cellulose. This is made by dough moulding equipment wherein the dough is pumped into shaped moulds which are conveyed to an oven to dehydrate the product and cure the gum system.

There is therefore a need in the pet food field for a product which is edible and consumable without gastrointestinal complications and effective to remove plaque and to inhibit the formation of tartar in pet animals such as dogs and cats.

This invention is directed to a pet oral care product, which product comprises an edible, solid product incorporating 30-60% dry weight of a chewable, flexible cellular starch matrix in which is incorporated 20-50% by weight of cellulosic fibrous material. The cellulosic fibrous material has a mechanical cleansing function which, when chewed by the ani-

mal, reduces tartar, stain and plaque on the animal's teeth through a physical cleansing action without causing gastrointestinal distress. An oral care agent may be incorporated in the matrix to inhibit dental health problems. When chewed, the flexible, cellular product does not easily fracture and the drag created as the product is chewed by the animal increases the time that the product is retained in the animal's mouth cavity and in contact with its teeth. The product is extruded from ingredients which are inert to oral care additives to assure maximum bioavailability of the additives. The extruded product preferably contains starch, cellulosic fibers, humectant, proteineous binder and one or more oral care additives.

not  
size.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

In general, the edible chew product of the present invention is made by admixing a starch containing ingredient, a cellulosic fibrous material, humectant, and proteineous binder and oral care additives such as tartar control and anti-caries additives and then subjecting the moistened admixture to mechanical working in an extruder at an elevated temperature so as to extrude an expanded product having a flexible, cellular matrix.

In the preparation of the chew product of the present invention, the solid components of the chew product; namely cellulosic fibrous material, starch, and proteineous binder together with any oral care additive, are first admixed together.

The cellulosic fibrous component which provides mechanical cleansing ability to remove dental plaque, stain, tartar and other materia alba accumulating on the animal's tooth surfaces when the product is chewed by the animal is a cellulosic fibrous material including corn cob fractions, cellulose fiber and other plant fibers or microbial polysaccharides. Corn cob fractions are preferred.

Although the cellulosic fibrous materials are not digested by the pet, the pet's digestive system is capable of handling such fibers by passing them through its system substantially unchanged. In fact, the cellulosic fibrous materials provide increased roughage and bulk so as to assist the pet in the digestion of food.

Generally, cellulosic fibrous materials such as corn cob fractions are included in the chew product at a concentration of about 20 to about 50% by dry weight of the chew product and preferably about 25 to about 35 % by weight. Corn cob fractions generally range in particle size from about 5 to about 1000 microns and preferably about 20 to about 250 microns.

Corn cob residues from both the woody and shaft portions of the cob are compatible with oral care additives such as tartar control additives including inorganic alkali pyrophosphate salts which are incorporated in the chew product. Corn cob fractions serve the additional function of being moisture absorbent contributing resiliency and flexibility to the chew product. Further, the corn cob fractions also provide a greater range of earth tones and contribute a positive aroma to the chew product.

The term "starch" as used herein includes within its meaning amylaceous hydroxylates containing mono-, di-, tri- and polysaccharides and mixtures thereof such as those derived from wheat, corn or like cereals or tubers. Starch forms a matrix superstructure into which the oral care additives including cellulosic fibrous particles and oral care additives are suspended.

During the fabrication of the chew product by mechanical working in an extruder, starch materials function as an expansion medium. The gelatinization of the mechanically worked product mass due to the heat and moisture introduced during the extrusion process swells the starch granules releasing amylose and amylopectins to thicken and form a gelatinized matrix. The proteineous binder undergoes a similar gelatinization reaction whereby the starch and binder join to form the cellular matrix structure.

Suitable starch materials useful in the preparation of the chew product of the present invention include wheat starch, corn starch, oat starch, rice starch and other complex carbohydrates. The starch, preferably wheat starch, may be included in the chew product at a concentration of about 30 to about 60% by dry weight and preferably about 40 to about 55% by dry weight of the product.

A proteineous binder may be incorporated in the chew product. It has an adhesive effect and binds together the solid particles to form a cohesive, integral mass when the ingredients are heated and extruded to form the expanded cellular product.

Proteineous binder materials suitable for use in the preparation of the chew products of the present invention include collagen and gelatin. Collagen derived from the digestion of beef bones is preferred in the practice of the invention. Gelatin derived from both pork skin and animal bones is also a preferred binder material. The binder material is preferably used in the preparation of the chew product of the present invention at a concentration of about 5 to about 20% by weight of the chew product and preferably about 8 to about 10% by weight. Collagen and gelatin materials also contribute to the flexible texture of the extruded cellular matrix chew product.

Oral care additives that may be incorporated in the chew products of the present invention include tartar control additives such as inorganic pyrophosphate salts including dialkali or tetra-alkali metal pyrophosphate salts such as  $\text{Na}_4\text{P}_2\text{O}_7$ ,  $\text{K}_4\text{P}_2\text{O}_7$ ,  $\text{Na}_2\text{K}_2\text{P}_2\text{O}_7$ ,  $\text{Na}_2\text{H}_2\text{P}_2\text{O}_7$ , and  $\text{K}_2\text{H}_2\text{P}_2\text{O}_7$  and combinations thereof. The tartar control additives are

incorporated in the chew products of the present invention at a concentration effective to inhibit tartar formation on the animal's teeth. Suitable concentrations of the pyrophosphate salts range from about 0.5 to about 15% by dry weight and preferably 1.0 to about 10% by dry weight of the chew product.

It is further preferred that a combination of alkali metal pyrophosphate salts be used and particularly a combination of potassium and sodium pyrophosphates at a weight ratio of about 5:1 to 1:1. A weight ratio of about 3:1 is especially preferred.

In addition to pyrophosphate tartar control additives, fluoride containing salts may also be incorporated in the chew product to inhibit phosphate enzymes that hydrolyze and degrade the pyrophosphate salts whereby the tartar control efficacy of these salts is otherwise reduced.

The fluoride-providing salts used in the practice of the present invention are characterized by their ability to release fluoride ions in water and by substantial freedom from reaction with the other ingredients of the chew product. Among these materials are inorganic salts, for example, sodium fluoride, potassium fluoride, a tin fluoride such as stannous fluoride or stannous chlorofluoride, and sodium monofluorophosphate. Alkali metal and tin fluorides, such as sodium fluoride, stannous fluoride, sodium monofluorophosphate and mixtures thereof, are preferred.

When included in the chew product, any suitable minimum amount of the fluoride salt may be used, but it is preferable to employ sufficient salt to release from about 0.05% to 1%, and preferably about 0.1% of fluoride ion. Typically, in the cases of alkali metal fluorides and stannous fluoride, the salt is present in an amount up to 2% by weight, based on the weight of the product, and preferably in the range of from 0.05% to 0.5% by weight.

Other agents suitable for incorporation in the chew product of the present invention include synthetic anionic linear polymeric polycarboxylates which are employed in the form of their partially or preferably fully neutralized water soluble alkali metal (e.g. potassium and preferably sodium) or ammonium salts. The polycarboxylates, like the fluoride salts, inhibit salivary enzymes which hydrolyze pyrophosphates to an inactive form. Preferred are preferably 1:4 to 4:1 copolymers, copolymers, of maleic anhydride or acid and a polymerizable ethylenically unsaturated monomer, preferably a lower alkyl vinyl ether such as methoxyethylene, having a molecular weight of about 30,000 to about 1,000,000. These copolymers are available commercially from GAF Corporation under the trademark Gantrez, e.g. Gantrez S-97 Pharmaceutical Grade (molecular weight 70,000). The polycarboxylates are preferably incorporated in the chew product of the present invention at a concentration of about 0.25 to about 4% by weight and preferably about 1.0 to about 3.0% by weight.

To impart flexibility to the chew product, it is advantageous to adjust the moisture content of the chew product so that the final product contains water at a concentration equal to or greater than 12% by weight and preferably 16 to 35% by weight.

A humectant is preferably incorporated in the chew product to enhance the flexible chew texture and retain moisture so as to maintain the texture when the chew is stored at ambient temperatures. The preferred humectants are glycerine and sorbitol. Typically, the humectant, preferably glycerin, is incorporated in the chew product at a concentration of about 1 to 15% by weight and preferably about 4 to about 10% by weight of the product.

Suitable flavoring materials may be employed to enhance the palatability of the chew product of the present invention. Examples of suitable flavoring constituents include garlic, wood smoke, meat, and fish extracts and fermentation residues.

Suitably, the flavoring agent comprises from about 0.01 to 5 percent by weight or more of the chew product of the present invention and preferably, about 0.8 to about 1.5 percent by weight.

The extruded chew product of the present invention is a solid composition having a cellular matrix and a chewy non-brittle texture which is not readily fractured when chewed by the animal and hence offers the animal the intended teeth cleansing benefits stemming from the mechanical cleansing and other contacts with the cellulosic fibrous particles and contained in the chew product. In addition, as the product does not fracture as the animal gnaws on the product, the product remains in contact with the teeth prolonging the bioavailability of the oral care additives contained therein.

As all the ingredients of the chew product are substantially inert and non-reactive with the oral care additives, they are compatible with the oral care additives so that these additives are stable and retain their efficacy during storage before use.

Due to the presence of relatively high moisture levels in the chew product, preservatives such as sodium benzoate, potassium sorbate, sodium propionate, sorbic acid, or paraaminobenzoic acid esters (parabens) alone and in combination may be incorporated into the product to inhibit mold bacteria, yeast formation and growth. The preservative may be incorporated in the chew product at a concentration in the range of about 0.05 to about 4.0% by dry weight and preferably in the range of about 0.1 to about 0.6% by dry weight.

To prepare the chew product, the starch, humectant, proteinaceous binder, cellulosic fibrous material and oral care additives are transferred to a steam pre-conditioner and subjected to steam and moisture in order to adjust the moisture content to between about 20 and 50% by weight. The conditioned mixture is then extruded under conditions of elevated temperature and pressure to form a continuous ribbon of expanded cellular product that is segmented into discrete particles or pieces by a rotating knife or other cutting means upon exit of the ribbon from the extruder. The chew particles

are then allowed to cool and dry at a controlled temperature, e.g. 65-75°F, (18-24°C) to adjust the moisture level to about 10 to about 30% by weight.

In the Figure, there is shown one embodiment of an extrusion apparatus 10 which can be used to manufacture the cellular chew product. The extrusion apparatus 10 includes an extruder 12 having a barrel 14 with an inlet 16 located below the outlet of a preconditioner 18; the extruder 12 also having an outlet 20 with a die 22. Hopper 11 is provided to pre-mix the ingredients prior to preconditioning. The barrel 14 as depicted comprises nine barrel sections 24, 25, 26, 27, 28, 29, 30, 31, 32, although the number of barrels may vary without departing from the principles of the present invention. The barrel sections are interconnected to present an elongated bore through the barrel 14 of the extruder 12. Two corotating, flighted material advancing screws (not shown) are received in the bore of the barrel and are intermeshed along the majority of the length of the extruder barrel 14 and terminate in the die section 22. The screws feed material to and through the extruder assembly, including a die, at an appropriate flow rate and under appropriate flow conditions. Extrusion apparatus 10 of the type illustrated in the Figure is manufactured by Wenger Manufacturing such as the Wenger TX-52 (research extruder) or Wenger TX 80 twin screw (commercial extruder). The pre-conditioner 18 shown in the Figure is also manufactured by Wenger Manufacturing, Inc.

In preparing the extruded cellular product of the present invention, using the Wenger TX-80, the solid ingredients from which the chew product is extruded are first pre-mixed in a mixer such as a ribbon mixer and fed to hopper 11. These pre-mixed ingredients include a cellulosic fibrous material such as corn cob fractions, starch, oral care additive, preservative and binder. The pre-mixed solid ingredient is then fed to the preconditioner 18 and admixed with the humectant and other liquid ingredients which are fed directly into the preconditioner 18. In the preconditioner 18 the mixture of ingredients is fed thereto at a rate between 10 and 20 pounds (lbs.)/minute (4.5-9 Kgs/min.) and is further mixed with water which is introduced into the preconditioner at a rate of 0.5 to 4.0 lbs/minute (0.2 to 1.8 Kgs/min.). The temperature of the mixture is raised from ambient to 150 to 200°F (65-93°C) (170°F (77°C) being preferred) by the injection of steam into the preconditioner 18 at the rate of 0.5 to 5.0 lbs/minute (0.2 to 2.3 Kgs/min.). Total residence time in the preconditioner 18 generally ranges from 0.5 to 1.5 minutes.

Preconditioning the mixture with steam and water initiates hydration of the binder which is completed by the mechanical working during the extrusion process. The humectant is desirably added after the mixture has been first contacted with the steam/water treatment so as not to compete with the binder for the moisturizing treatment in the preconditioner.

Once the mixture of ingredients and water is introduced into the extruder barrel 14, the mixture is advanced along the length of the barrel 14 by axial rotation of the twin screws. The mixture is sequentially advanced through the extruder and finally through the die 22 at the outlet of the extruder 12, the die 22 having an orifice shaped to yield a ribbon of expanded cellular product. As the mixture passes through the barrel sections 24, 25, 26, 27, 28, 29, 30, 31, and 32, it is mixed, cooked at product temperatures in the range of 200-280°F (93-138°C) to cause expansion of the extrudate product as it leaves the die 22.

Typically, barrel sections 24, 25 and 26 comprise a Mixing Zone where the moisturized product mixture is introduced and compressed into the extruder barrel 14 at a temperature of 100-120°F (38-49°C), followed by a Cooking Zone, barrel sections 27, 28 and 29 where the mixture is cooked at a temperature of about 140 (60°C) to about 200°F (93°C). This is followed by an Expansion Zone (barrel sections 30, 31, 32) where the gelatinized mixture undergoes expansion. Thereafter, the product further expands as it is blown out through the orifice of the die 22 as ribbon 33. The blowing out induces the product to further puff or expand to form the desired cellular matrix product.

The pressure within the extruder ranges from about 0 to 100 psi in the Mixing Zone, about 10 to 200 psi in the Cooking Zone and about 100 to 1,000 psi in the Expansion Zone. The residence time in any one zone is about 10 to about 45 seconds and generally about 30 seconds.

The expanded cellular product as it leaves the extruder has a moisture content of about 10 to about 35% water by weight and preferably about 15 to about 25% water by weight.

The thickness of the extruded cellular product is controlled so that it has a thickness of about 0.25 (0.56 cms) to about 0.75 inches (1.9 cms) upon leaving the extruder die 22. The ribbon of cellular matrix extrudate 33 is then cut and subdivided into longitudinal 1 to 5 inch (2.5 to 12.7 cms) sections and allowed to cool and dry to a moisture content of about 12 about 35% by weight water.

The invention is further illustrated by the following specific but non-limiting Example.

#### EXAMPLE

A mix for the preparation of a dog chew designated "Chew Product I" was prepared which contained the following ingredients:

	<u>Ingredient</u>	<u>Weight %</u>
5	Wheat Starch	45.42
	Corn Cob Fraction*	32.58
	Gelatin (225 Bloom)	9.87
10	Glycerin	4.44
	Potassium Sorbate	0.30
	Gantrez S-97 (approx. 13% soln)	1.92
15	$K_4P_2O_7$	4.00
	$Na_4P_2O_7$	1.38

20 \* 60 mesh fraction. Particle size less than 0.15 millimeter, 90% less than 150 microns. Typical sieve analysis as follows:

	mesh (US Sieve Series)	Opening size	%	mm
25	>50	>0.297mm	0.1	0.30
	<50>60	<0.297mm>0.250mm	2.0	0.25
	<60>100	<0.250mm>0.149mm	55.0	0.15
30	<100	<0.149mm	45.0	<0.15

35 The wheat starch, corn cob fraction, pyrophosphate salts, and potassium sorbate were fed to the hopper 11, of a Wenger research twin screw extruder (Model No. TX-52) equipped with a preconditioner 18, and processed to obtain an expanded chew product having a flexible cellular matrix. The TX-52 machine was of the type schematically illustrated in the figure and was provided with two rotatable, flighted material advancing screws and had a total of 9 barrel sections and terminated in a rounded rectangular port with rate controlling throttle valve.

40 This mixture having a moisture content of 10.82% was fed to the preconditioner at a rate of 150.0 pounds (168 Kgs) per hour. The mixture was raised in temperature to 170°F (77°C) by the injection of steam introduced at a rate of 0.070 pounds (0.03 Kgs) per minute into the preconditioner. Water was introduced into the preconditioner at the rate of 0.50 pound (0.2 Kgs) per minute. The glycerin and Gantrez ingredients were added to the preconditioner at this point.

Next, the mixture was fed into the inlet 16 of the extruder mixing zone and steam was introduced into the mixture at a rate of 0.080 pounds (0.036 Kgs) per minute. The screws of the extruder were rotated at a speed of 380 rpm.

45 Temperatures of the barrel sections were maintained at 111°F (44°C), 111°F (44°C), 149°F (68°C), 193°F (89°C), 182°F (83°C), 151°F (66°C) and 212°F (100°C) for the second, third, fourth, fifth, sixth, seventh, eighth and ninth barrel sections respectively. Product rate through the extruder was about 200 pounds (91 Kgs) per hour. The product was extruded as continuous flexible ribbon 1.0 inch (2.5 cms) wide and 0.25 inch (0.6 cms) thick having a cellular matrix with a water content of 28.01% by weight. The extrudate ribbon was cut into 1.5 foot (46 cms) sections at the extruder head with a rotating knife. The extrudate sections were allowed to dry at ambient temperature in air for one hour. The air dried extrudate sections were determined to have a moisture content of 20% by weight. The dried extrudate sections were further subdivided into 2.75 inch (7 cms) pieces to prepare the final chew product. The final chew product had a spongy, flexible cellular matrix, light tan in color.

55 A group of 10 pure-bred beagle dogs (ages 1 to 6 years) were individually fed 4 pieces of the chew product daily together with a diet of a commercial canned dog food sold under the name "Hills Canned Canine Maintenance" by Hills Pet Products, Topeka, Kansas, adequate to maintain the weight of each dog for a one week test period. The dogs were fed the canned dog food at about 8 a.m. and two (2) chews at about 10 a.m. and again at about 3 p.m. The individual piece of chew product each weighed about 5 grams.

In observing the eating style of the dogs, it was noted that although the canned dog food ration tended to be gulped by the dogs, the spongy cellular chew product was chewed repeatedly before being swallowed. This chewing action increased the residence time that the chew product was in the dog's mouth thereby increasing the contact time with the teeth of the corn cob particles and pyrophosphate salts contained in the product.

Prior to the feeding test, each dog had been given a thorough dental prophylaxis to remove existing soft and hard deposits on the buccal surfaces of the maxilla and mandible (a total of 22 teeth per dog).

The teeth of each dog in the group was examined for plaque, stain and tartar upon the completion of the test period.

In this examination, each tooth was divided horizontally into a gingival half (next to the gumline) and an occlusal half (away from the gumline). Plaque was scored visually on the corresponding tooth surfaces after staining with 3% erythrosin solution using the following criteria: 1, plaque coverage of up to 25% of the buccal tooth surface; 2, plaque covering between 25 and 50% of the buccal tooth surface; 3, plaque covering between 50 and 75% of the buccal tooth surface and 4, plaque covering between 75 and 100% of the buccal tooth surface.

The thickness of the plaque was scored as follows: Light= 1, Medium= 2 and Heavy= 3. Coverage and thickness scores for each individual tooth surface were then multiplied, to give a total score for that tooth surface. Gingival and occlusal scores were added for each tooth. All tooth scores were added for each animal, then divided by the number of teeth scored to give a mean plaque score for the animal. A mean group plaque score was obtained by averaging individual scores of all animals in the group.

Stain was scored visually on the corresponding tooth surfaces after drying the tooth surface with a gentle jet of air using the following criteria; each tooth was divided vertically into 3 segments, mesial, buccal and distal; the coverage and color of the stain in each segment was then graded independently; 1, stain coverage of up to 25% of the (mesial, buccal or distal) surface, 2, up to 50%; 3, up to 75% and 4, up to 100%. The stain color was scored 1,L (light), 2,M (medium) and 3,D (dark). Coverage and thickness scores for each individual tooth surface were then multiplied, to give a total score for that tooth surface. Mesial, buccal and distal segment scores were added for each tooth. All tooth scores were added for each animal, then divided by the number of teeth scored to give a mean stain score for the animal. A mean group stain score was obtained by averaging individual scores of all animals in the group.

Tartar was scored visually for area coverage on the corresponding tooth surfaces in the same manner as stain.

The plaque, stain and tartar scores for this group of dogs which were fed Chew Product I are recorded in Table I below. For purposes of comparison, the procedure of the Example was repeated with the exception that the dogs were not fed the chew product. The results of this test are also recorded in Table I below with the designation "Control".

The procedure of the Example was repeated with the exception that the chew product fed to the dogs was derived from an extrudate which did not contain any pyrophosphate salts. This chew product was designated "Chew Product II". The plaque, stain and tartar scores for the group of dogs fed Chew Product II are also recorded in Table I.

For purposes of further comparison, the procedure of the Example was repeated with the exception that, instead of the chew product of the present invention, the dogs were fed four biscuits of a commercially available baked biscuit product containing a pyrophosphate salt oral care additive. The results of this test are also recorded in Table I below with the designation "comparison I".

TABLE I

Chew Product	Mean Group Plaque Score	Mean Group Stain Score	Mean Group Tartar Score
CHEW PRODUCT I	5.59	1.26	2.43
CHEW PRODUCT II	6.77	2.35	3.49
COMPARISON I	8.34	3.24	4.54
CONTROL	8.87	3.60	5.10

The above results show that the chew product of the present invention, namely Chew Products I and II, is significantly effective in reducing plaque, stain and tartar in dogs, especially when compared to the control as well as the comparative chew product.

Based on the mean group scores of Table I, the percent reduction obtained in plaque, stain and tartar as obtained with the chew products of the present invention (Chew Products I and II) or the commercial baked product compared to not feeding the dogs a chew product, is summarized in Table II below.

TABLE II

% REDUCTION			
	PLAQUE	STAIN	TARTAR
CHEW PRODUCT I	37.0	65.0	52.4
CHEW PRODUCT II	23.7	34.7	31.6
COMPARISON I	6.0	10.0	11.0

The data recorded in Table II demonstrate the significantly greater reduction in plaque, stain and tartar obtained with the chew product of the present invention when compared to a commercial baked product containing a pyrophosphate salt oral care additive.

#### Claims

1. A pet oral care product, which product comprises an edible, solid product incorporating 30-60% dry weight of a chewable, flexible cellular starch matrix in which is incorporated 20-50% by weight of cellulosic fibrous material.
2. A composition as claimed in claim 1 characterised in that the cellulosic fibrous material is corn cob fractions.
3. A product as claimed in claim 1 or claim 2 characterised in that the cellular matrix incorporates a proteinaceous binder.
4. A product as claimed in claim 1, 2 or 3 characterised in that an effective amount of an oral care additive is incorporated in the cellular matrix, the cellular matrix being substantially inert to the oral care additive.
5. A product as claimed in claim 4 characterised in that the oral care additive comprises alkali metal pyrophosphate salt.
6. A product as claimed in claim 4 characterised in that the alkali metal pyrophosphate salt is a mixture of potassium and sodium pyrophosphates at a weight ratio of about 5:1 to about 3:1.
7. A product as claimed in any one of claims 1 to 6 characterised in that water is contained in the cellular matrix at a concentration of about 10 to 35% by weight.
8. A product as claimed in any one of claims 1 to 7 characterised in that the product comprises a humectant.
9. A product as claimed in any one of claims 1 to 8 characterised in that the product comprises linear polymeric polycarboxylate.
10. The use of a cellulosic fibrous material incorporated in a flexible, cellular starch matrix to produce a pet care oral product as claimed in any one of claims 1 to 9 for feeding to animals so as to remove plaque, tartar and stain from the teeth of the animal when the product is chewed by the animal.

#### Patentansprüche

1. Mundpflegeprodukt für Haustiere, das ein eßbares, festes Produkt umfaßt, das 30 bis 60% Trockengewicht einer kauenbaren, flexiblen cellulären Stärkematrix einführt, in der 20 bis 50 Gew.% cellulosisches Fasermaterial enthalten sind.
2. Zusammensetzung nach Anspruch 1, dadurch gekennzeichnet, daß das cellulosische Fasermaterial aus Maiskolbenfraktionen besteht.
3. Produkt nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß die celluläre Matrix proteinhaltiges Bindemittel einführt.

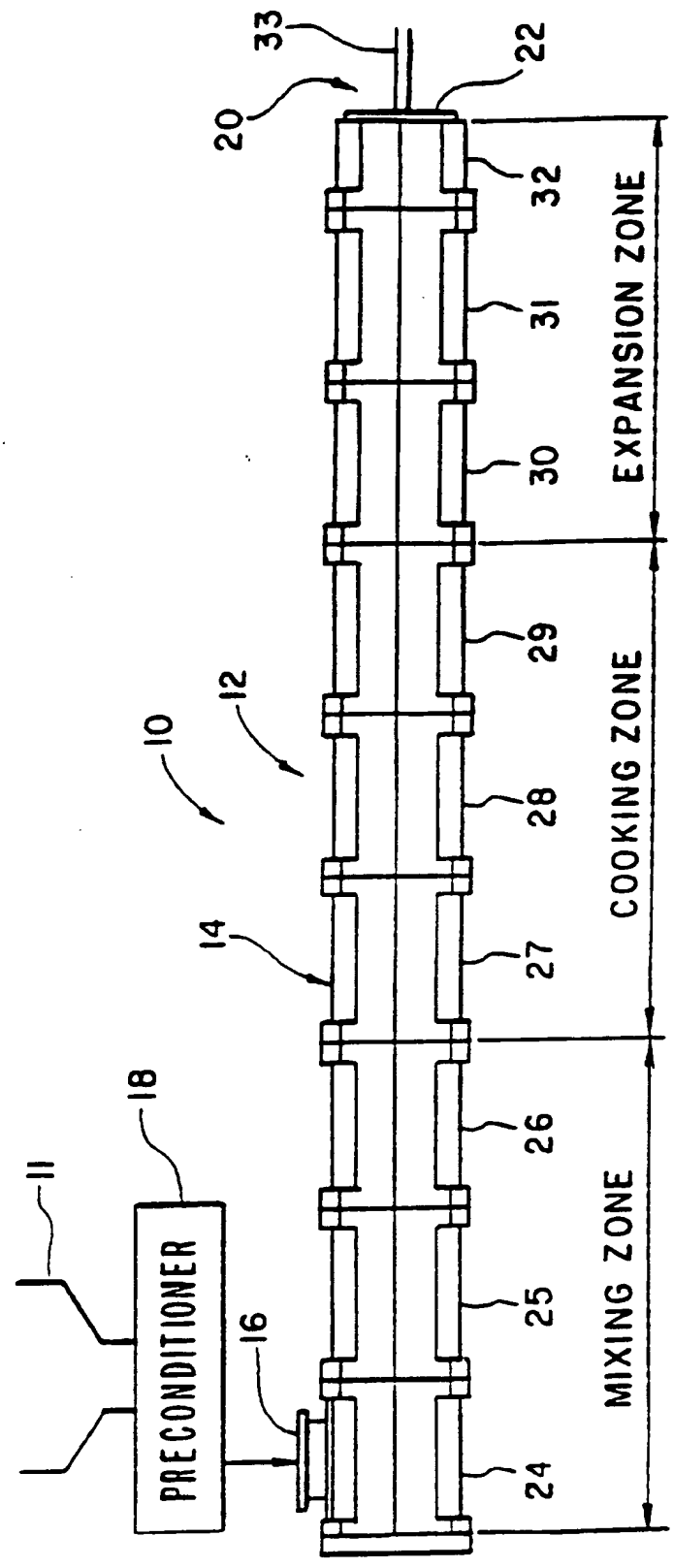
4. Produkt nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß eine wirksame Menge eines Mundpflege-Additivs in der cellulären Matrix enthalten ist, wobei die celluläre Matrix gegenüber dem Mundpflege-Additiv im wesentlichen inert ist.
- 5 5. Produkt nach Anspruch 4, dadurch gekennzeichnet, daß das Mundpflege-Additiv Alkalimetallpyrophosphatsalz umfaßt.
6. Produkt nach Anspruch 4, dadurch gekennzeichnet, daß das Alkalimetallpyrophosphat eine Mischung aus Kalium- und Natriumpyrophosphaten in einem Gewichtsverhältnis von etwa 5:1 bis etwa 3:1 ist.
- 10 7. Produkt nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß in der cellulären Matrix Wasser in einer Konzentration von etwa 10 bis 35 Gew.% enthalten ist.
8. Produkt nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß das Produkt Feuchthaltemittel umfaßt.
- 15 9. Produkt nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß das Produkt linear polymeres Polycarboxylat umfaßt.
- 20 10. Verwendung eines cellulosischen Fasermaterials, das in einer flexiblen, cellulären Stärkematrix eingeführt ist, zur Herstellung eines Mundpflegeprodukts für Haustiere gemäß einem der Ansprüche 1 bis 9 zum Verfüttern an Tiere, um so Plaque, Zahnstein und Flecken von den Zähnen der Tiere zu entfernen, wenn das Produkt von dem Tier gekaut wird.

#### Revendications

- 25 1. Produit pour soins buccaux d'animaux domestiques, comprenant un produit comestible solide incluant 30 à 60 % en poids de matière sèche d'une matrice d'amidon cellulaire flexible masticable dans laquelle sont incorporés 20 à 50 % en poids d'un matériau fibreux cellulosique.
- 30 2. Composition selon la revendication 1, caractérisée en ce que le matériau fibreux cellulosique consiste en des fractions d'épis de maïs.
3. Produit selon la revendication 1 ou la revendication 2, caractérisé en ce qu'un liant protéinique est incorporé dans la matrice cellulaire.
- 35 4. Produit selon la revendication 1, 2 ou 3, caractérisé en ce qu'une quantité efficace d'un additif pour soins buccaux est incorporée dans la matrice cellulaire, la matrice cellulaire étant essentiellement inerte vis-à-vis de l'additif pour soins buccaux.
- 40 5. Produit selon la revendication 4, caractérisé en ce que l'additif pour soins buccaux comprend un sel pyrophosphate de métal alcalin.
6. Produit selon la revendication 4, caractérisé en ce que le sel pyrophosphate de métal alcalin est un mélange de pyrophosphates de potassium et de sodium dans un rapport pondéral d'environ 5:1 à environ 3:1.
- 45 7. Produit selon l'une quelconque des revendications 1 à 6, caractérisé en ce que l'eau est contenue dans la matrice cellulaire à une concentration d'environ 10 à 35 % en poids.
8. Produit selon l'une quelconque des revendications 1 à 7, caractérisé en ce que le produit comprend un agent humectant.
- 50 9. Produit selon l'une quelconque des revendications 1 à 8, caractérisé en ce que le produit comprend un polycarboxylate de type polymère linéaire.
- 55 10. Utilisation d'un matériau fibreux cellulosique incorporé dans une matrice d'amidon cellulaire flexible pour la production d'un produit pour soins buccaux d'animaux domestiques selon l'une quelconque des revendications 1 à 9 pour alimenter des animaux de façon à éliminer la plaque dentaire, les taches et le tartre des dents de l'animal lorsque le produit est mastiqué par l'animal.



FIG. 1



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